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**Biomaterials to prevascularize engineered tissues.**

**Journal:** J Cardiovasc Transl Res

**Publication Year:** 2011

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**PubMed link:** 21892744

**Funding Grants:** UCI-CIRM Research Training Program II

**Public Summary:**

Tissue engineering promises to restore tissue and organ function following injury or failure by creating functional and transplantable artificial tissues. The development of artificial tissues with dimensions that exceed the certain sizes will require nutrients and oxygen to be delivered via perfusion (or convection) rather than diffusion alone. One strategy of perfusion is to create tissues that contain blood vessels; that is, a network of blood vessels is created within the tissue construct prior to implantation, which has the potential to significantly shorten the time of functional vascular connection from the host. The prevascularized network of vessels requires a scaffold for 3D support, which can be either natural or synthetic. This review surveys the commonly used biomaterials for prevascularizing 3D tissue engineering constructs.

**Scientific Abstract:**

Tissue engineering promises to restore tissue and organ function following injury or failure by creating functional and transplantable artificial tissues. The development of artificial tissues with dimensions that exceed the diffusion limit (1-2 mm) will require nutrients and oxygen to be delivered via perfusion (or convection) rather than diffusion alone. One strategy of perfusion is to prevascularize tissues; that is, a network of blood vessels is created within the tissue construct prior to implantation, which has the potential to significantly shorten the time of functional vascular perfusion from the host. The prevascularized network of vessels requires an extracellular matrix or scaffold for 3D support, which can be either natural or synthetic. This review surveys the commonly used biomaterials for prevascularizing 3D tissue engineering constructs.

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